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(54) Method and apparatus for a merchandise checkout system

(57) A method and system for a merchandise checkout system utilizes a remote scanning device, a shopping cart and bags for allowing a purchaser to buy merchandise unassisted by store personnel. The remote scanning device reads product identity information from coded levels on products chosen by the purchaser and sends the information to a central processor. The central processor has a memory, which indexes price information and weight for each product based on the product identity information. The central processor sends an accumulated price and weight transaction to the remote scanning device for the purchaser's use. The product identity information on the products further include a security tag device which is deactivated by the remote scanning device. The purchaser upon completion of their purchases takes their shopping cart to a security station for weighing in on a scale wherein an actual combined weight of the shopping cart, bags and products is compared to a predicted weight determined by the central processor and generating a notification signal if a discrepancy occurs. The security station further verifies that the security tag devices have been deactivated and also generates a notification signal. The purchaser next goes to a payment checkout terminal coupled to the central processor, wherein the payment checkout terminal effects financial transactions including acceptance of payment for transactions initiated by the remote scanning device, and the payment checkout terminal is operable by store personnel only.

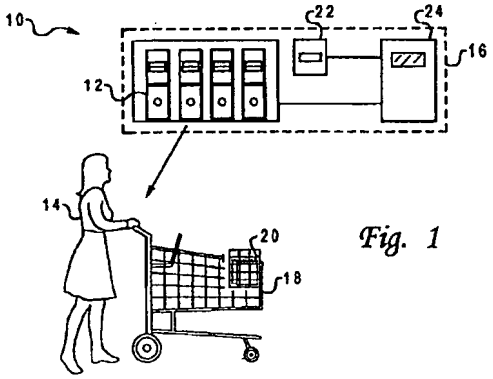

Fig. 1

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Description

[0001] The present invention is directed to a method and system for merchandise checkouts.

[0002] Large retail stores frequently have many checkout lanes in order to be able to handle higher customer throughput at peak periods. Such lanes tend to be crowded together as much as possible in an attempt to minimize the square footage required for the checkout function. Additionally, many of these lanes remain idle during a considerable portion of any given business day and waste the square footage allocated to them.

[0003] A modern retail or grocery store checkout lane typically includes a cash register that is used to check out merchandise items bearing bar code labels. A cashier removes items from a movable conveyor belt one at a time, drags them across the laser beam of a fixed scanner (e.g., a "slot" scanner built into a horizontal counter), and places them on a shopping carrier, such as a cart. The fixed scanner is linked with a processor, e.g., a CPU built into the cash register, that translates the bar code symbol on a package into a cash register entry including the price of the scanned item. Downstream of the cash register on the conveyor belt is a sacking station; one or more baggers removes previously scanned items from the conveyor belt and places items in paper or plastic bags. When all items have been scanned or otherwise checked, the cash register tallies the prices of the items, factors in any discounts (e.g., coupon discounts) or other adjustments (e.g., sales taxes on some items), displays the total to be paid by the customer, and prints a receipt. While the purchases are being "rung up," the customer may write a cheque to pay for the purchases or deliver a credit card to the cashier.

[0004] A problem that arises with the above-described system is the fact that typically only one person at a times empties a shopping cart and scans the items contained therein thereby limiting the efficiency of the process. It is conceivable that two or more people could theoretically share a fixed scanner, but this could easily create physical coordination problems involving each person getting in the other person's way. Long customer lines occur because of the current system of checking out merchandise and this results in wasted time for the consumer. Valuable retail space that could be used for more merchandise is lost in supporting multiple checkout lanes and store revenue is lost in supporting the store staff to handle the operations.

[0005] Additionally, shoplifting is a major problem for retail stores, resulting in the loss of millions of pounds each year. The most common type of shoplifting is that in which the shoplifter removes the shoplifted item from a store by wearing the item or by hiding the item on their person or in their bags. One well-known system developed to reduce this type of shoplifting involves attaching a security tag to the items in the store. The security tag contains a circuit or other means that interacts with a detection system located near the exit of the store. The detection system sounds an alarm if an item passes therethrough with a security tag that has not been deactivated. This type of security tag is typically deactivated or removed by a cashier when the item is purchased. The tag is usually deactivated by being passed over an electromagnetic apparatus.

[0006] However, a problem arises with this type of security system in that if a store cashier is acting in concert with the shoplifter, the cashier may deactivate or remove the security tags without accepting payment for the items. Typically, the shoplifter will bring a number of purchases to the cashier, who will ring up less than all of the purchases, often discounting the prices on the purchased items. The cashier will then place the remaining unpurchased items in the shoplifter's bags. Prior to placing the items in the bags, the cashier will deactivate the security tags on the stolen items so that the security detection apparatus near the exit of the store will not detect them. Therefore, if a cashier is acting in concert with a shoplifter, it is possible to steal a very large number of items with relative ease.

[0007] Accordingly the invention provides method for a merchandise checkout system comprising: providing a purchaser with a remote scanning device for scanning in product identity information; wirelessly transmitting said product identity information to a computer system, said computer system having a price information corresponding to each of said product identity information, said computer system calculating said price information from each of said product identity information to accumulate a total; and providing said total to one of a plurality of terminals when said purchaser is finished.

[0008] Such a method speeds up throughput for checking out and paying for multiple items in a high volume store.

[0009] In another aspect, the invention provides a system for merchandise checkout comprising: means for remotely scanning product identity information from on products chosen by a purchaser; means for wirelessly transmitting said product identity information to a computer system having a memory indexing price information with said product identity information to accumulate a transaction total from a series of products presented for purchase; and means for providing said transaction total to one or a plurality of check-out terminals in response to a presence of said purchaser wherein a payment amount is presented.

[0010] A preferred embodiment of the present invention further comprises means for accepting discount coupons from said purchaser and transferring information on said coupons to said computer system for adjusting said indexing price information delivered to said purchaser.

[0011] According to the preferred embodiment, the checkout system provides a high level of security in processing purchased merchandise items that enables a self-service operation to occur. The purchaser is able

to bag and scan their own merchandise.

[0012] According to the preferred embodiment, the method and system for a merchandise checkout system utilizes a remote scanning device, a shopping cart and bags for allowing a purchaser to buy merchandise unassisted by store personnel. The method and system consists of having a remote scanning device that reads product identity information from coded levels on products chosen by the purchaser and sends the information to a central processor.

[0013] According to the preferred embodiment, the computer system or central processor has a radio frequency (RF) transceiver and the remote scanning device also has said radio frequency (RF) transceiver. When said purchaser scans said product identity information said product identity information is transmitted to and received by said computer system for calculating a new total price wherein said new total price is transmitted to and received by said remote scanning device and displayed to said purchaser.

[0014] The central processor has a memory, which indexes price information and weight for each product based on the product identity information. The central processor sends an accumulated price and weight transaction to the remote scanning device for the purchaser's use. The product identity information on the products further includes a security tag device which is deactivated by the remote scanning device. According to the preferred embodiment, the system comprises means for notifying the purchaser that a successful scan of a product has taken place and deactivation of the security tag device has been accomplished. The purchaser upon completion of their purchases takes their shopping cart to a security station for weighing in on a scale wherein an actual combined weight of the shopping cart, bags and products is compared to a predicted weight determined by the central processor and generating a notification signal if a discrepancy occurs. I.e when the actual total weight is not within a predetermined range of the predicted total weight for the transaction. The security station further verifies that the security tag devices have been deactivated and also generates a notification signal if at least one of the products having a security tag device has not been deactivated by the remote scanning device. The purchaser next goes to a payment checkout terminal coupled to the central processor, wherein the payment checkout terminal effects financial transactions including acceptance of payment for transactions initiated by the remote scanning device, and the payment checkout terminal is operable by store personnel only.

[0015] A preferred embodiment of the present invention provides a system for operator-unassisted checkout of randomly disposed articles in a shopping cart at a checkout area, a system without directly contacting the articles in the shopping cart and discriminating between the articles of the shopping cart to determine which have not been properly checked out. The system of the present invention is inexpensive and easy to manufacture, maintain and operate.

[0016] In a yet further aspect, the invention provides an apparatus for use in a merchandise checkout system comprising: a remote scanning device operable to read product identity information on products; said remote scanning device for wirelessly transmitting said product identity information to a computer system; and said remote scanning device deactivating security measures associated with said products.

[0017] A preferred embodiment of the present invention will now be described in detail, by way of example, with reference to the following drawings:

Figure 1 is a block diagram of a starting point for a merchandise checkout system in accordance with a preferred embodiment of the present invention;

Figure 2 is a block diagram of using a remote scanning device with the checkout system shown in Figure 1 according to a preferred embodiment of the present invention;

Figure 3 is a sectional view of a preferred embodiment of a remote scanning device for use with the checkout system shown in Figure 2;

Figure 4 is a preferred embodiment of a circuit diagram for use in a security tag device which may be used with the checkout system shown in Figure 2;

Figure 5A is a perspective view of a produce stand, bag holder, weight scale and bar code printer and dispenser in accordance with a preferred embodiment of the checkout system of the present invention;

Figure 5B is a perspective view of a bag of produce with a bar coded label applied thereon;

Figure 6 is a block diagram of a security station and checkout terminal positioned near an exit of the checkout system in accordance with a preferred embodiment of the present invention; and

Figure 7 is a flow diagram of an algorithm used to determine if a weight discrepancy exits with the security station shown in Figure 6 in accordance with a preferred embodiment of the present invention.

[0018] With reference to Figure 1, there is depicted a block diagram of one starting point for a merchandise checkout system 10 in accordance with a preferred embodiment of the present invention. The merchandise checkout system 10 consists of delivering a remote scanning device 12 to a purchaser 14 at a check-in station 16 positioned near an entrance of the checkout system 10 and having the purchaser 14 pick up a shopping cart 18 and bags 20 for the placement of products chosen by the purchaser 14. As will be more fully described below, the remote scanning device 12 is operable to read product identity information from coded levels on products chosen by the purchaser 14. According to the preferred embodiment, the check-in station 16 consists of a reader 22 for accepting discount coupons (not

shown) from the purchaser 14 and for transferring this information from the coupons to a central processor or computer system 24 for adjusting the indexing price information for use with the remote scanning device 12 utilized by the purchaser 14.

[0019] Referring now to Figure 2, there is shown a block diagram of a preferred embodiment of using the remote scanning device 12 with the checkout system 16 shown in Figure 1. As shown in Figure 2, the remote scanning device 12 reads product identity information 26 from coded levels on products 34 chosen by the purchaser 14 and sends the information to the central processor or computer system 24 by any wireless telecommunication techniques known in the data communication arts. By way of example but not of limitation, the coded levels may be industry standard bar codes read by infra-red technology. The central processor or computer system has a memory 36, which indexes price information and weight for each product 34 based on the product identity information 26. The central processor 24 sends an accumulated price and weight transaction to the remote scanning device 12 where it is shown on a display 38 for the purchaser's 14 use, as will be more fully detailed below. The product identity information 26 on the products 34 further includes a security tag device 28 which is deactivated by the remote scanning device 12, as will be more fully described below.

[0020] According to the preferred embodiment, the remote scanning device 12 and central processor or computer system 24 each include a radio frequency (RF) transceiver 32 so that the remote scanning device 12 and central processor 24 are coupled to each other for data communication. In accordance with the method of a preferred embodiment of the present invention, the purchaser 14, utilizes the remote scanning device 12 to read the product identity information 26 which then transmits the information 26 to be received by the central processor 24. The central processor or computer system 24 using its indexing price information in memory 34 in association with the received product identity information 26 calculates a new total price wherein the new total price is transmitted to and received by the remote scanning device 12 and displayed 38 to the purchaser 14.

[0021] Additionally, the central processor or computer system 24 has included in memory 36 the weight of each product 34 in association with the product identity information 26 wherein the central processor or computer system 24 and the remote scanning device 12 are operable in conjunction with each other to accumulate a weight transaction from a series of products 34 presented for purchase. According to the preferred embodiment, the remote scanning device 12 further includes an indication such as a short beep through a speaker 30 for notifying the purchaser 14 that a successful read of the product identity information 26 and deactivation of the security tag device 28 has been accomplished.

[0022] Turning now to Figure 3, there is illustrated one remote scanning device 12 for use in accordance with a preferred embodiment of the present invention. Although other remote scanning devices 12 may be advantageously employed in the checkout system 16, a hand-held, laser-scan, bar code reader unit illustrated in Figure 3 is an example of a remote unit particularly suited for use in the checkout system 16 of Figure 1.

[0023] According to the preferred embodiment, an outgoing light beam 40 is generated in the remote scanning device 12, usually as a laser diode or the like, and directed to impinge on a bar code symbol 26 (shown in figure 2) a few inches from the front of the remote scanning device 12. The outgoing beam 40 is scanned in a fixed linear pattern, and the purchaser positions the remote scanning unit 12 so this scan pattern traverses the bar code symbol to be read. Reflected light 42 from the symbol is detected by a light-responsive device 44 in the remote scanning unit 12, producing serial electrical signals to be processed for identifying the bar code symbol 26.

[0024] According to the preferred embodiment, the remote scanning device 12 may be designed as a gun-shaped device having a pistol grip type of handle 46, wherein a movable trigger 48 is employed to allow the purchaser to activate the light beam 40 and to allow incased detector circuitry when pointed at the bar code symbol 26 to be read, thereby saving battery life if the unit is self powered. A lightweight plastic housing 50 contains the laser light source, the detector 46, and the optics and signal processing circuitry for use with the RF transceiver 32 of Figure 2, as well as a battery. A light transmissive window 52 in the front end of the housing 50 allows the outgoing light beam 40 to exit and the incoming reflected light 42 to enter.

[0025] Also seen in Figure 3 in connection with the remote scanning device 12 are a lens 54 used to collimate and focus the scanned beam into the bar code symbol 26 of figure 2 at the proper depth of field. Additionally, a light source 56 such as a semiconductor diode; and an oscillating mirror attached to a scanning motor 58 are activated when the trigger 48 is pulled. The electronic components for translating, storing and sending the total price to a display screen 66 are mounted on one or more small circuit boards 64 within the housing 50, and the batteries 68 are enclosed to provide a self-contained portable unit. The antenna may be printed on one of the circuit boards 64.

[0026] Referring now to Figures 3 and 4, there is shown a preferred embodiment for a security tag device 28 and a method to deactivate it. As shown in Figure 4, the security tag device consists of a resonating circuit 78 having a resistor 70, capacitor 72 and fuse 74 connected together in electrical series. In operation the circuit 78 is designed to resonant at a particular electromagnetic frequency, for example in the 1 to 1.2 Ghz range. If a strong enough electromagnetic wave 76 impinges on the circuit, the circuit will excite and generate enough current to blow the fuse 74 thereby disabling the

electrical circuit 78 and deactivating the security tag device 28. It should be appreciated by those skilled in the art that the electrical circuit 78 might be fabricated using discrete components, mylar techniques or other thin film applications known in the electrical arts.

[0027] Turning once again to Figure 3, the remote scanning device 12 includes RF circuitry 60 to produce a frequency and able to generate sufficient power to launch a pulse of an electromagnetic wave 76 through antenna 62 to disable the electrical circuit and deactivate the security tag device 28 as described above. The RF circuitry 60 is coupled to the trigger 48 so that the security device will be disabled at the same instance the bar code symbol 26 is read.

[0028] Although not shown, it should be appreciated that at least one or more return stations are positioned throughout the store for store personnel to receive unwanted products that have already been scanned by a purchaser. In this case the store personnel receives the product from a purchaser who has changed their mind about the purchase, updates the remote scanning device 12 with the central processor to reflect an adjusted price total and weight and returns the remote scanning device 12 to the purchaser for continued use. Since the electrical circuit 78 has been disabled, the store personnel then or at a later time replaces the product identity information having security tag device 28 with a new product identity information and security tag device 28 on the returned products and returns the products to the shelf.

[0029] Referring now to Figures 5A and 5B, there is shown a perspective view for handling non-bar coded items such as produce according to a preferred embodiment of the present invention. Figure 5A illustrates a typical produce stand 79 or produce dispenser containing fruit or vegetables 80 or the like. Attached to the produce stand 79 is a bag holder 82 containing thin clear plastic bags 84 and a bar code printer and dispenser 86. Adjacent to the produce stand 79 is a weight scale 88 for measuring the produce 80 that the purchaser wishes to buy.

[0030] In accordance with the method of a preferred embodiment of the present invention, the purchaser places the amount of produce 80 they desire in a clear plastic bag 84 and places the bag 84 and produce 80 on the weight scale 88. Next, after the weight has been determined the bar coded dispenser 86 is activated which contains self-adhesive bar coded labels indicative of a product code corresponding to the adjacently located produce 80. A self-adhesive bar coded label 90 (shown in figure 5B) is then printed and dispensed after produce is placed and weighed in the produce bags.

[0031] Referring now to Figure 5B in more detail, the self-adhesive bar coded labels 90 are attached to the produce bags 84 containing the produce 80 and then read by the remote scanning device 12. For enhanced security, at least one or more monitoring stations are positioned adjacent to the produce stands 79 for store personnel to verify that the produce bags 84 are properly weighed, labeled and read by the remote scanning device 12 by the purchaser.

[0032] Referring now to Figure 6, there is illustrated a block diagram of a security station 92 and checkout terminal 94 positioned near an exit of the checkout system which may be used in accordance with a preferred embodiment of the present invention. The security station 92 is located in front of the checkout terminal 94 for verification that the security methods of a preferred embodiment of the present invention have been properly executed before payment is accepted. The security station 92 includes a security tag detection device apparatus 96 for generating a notification signal if at least one item in the shopping cart 18 and the bags 20 has not been deactivated by the remote scanning device. The security detection apparatus 96 has electrical circuitry 98 that sends and receives the proper electromagnetic frequency that has been described before, but at a much lower power level. If the fuse within the security device tag has not been blown, the security device tag will launch a resonant spike, which will be detected by the security tag detection device 96, and an alarm will go off.

[0033] According to the preferred embodiment, the security station 92 further includes a weight scale 100 for determining the actual combined total weight of the shopping cart 18 and bags 20 containing the products 34 which have been purchased during a purchase transaction using the remote scanning device 12.

[0034] Turning now to Figure 7, there is shown a flow diagram of the algorithm used to determine if a weight discrepancy exits, in accordance with a preferred embodiment of the present invention. To start 102, the shopping cart containing the products within the bags is moved onto the weight scale 104, as shown in Figure 6. The actual combined total weight of the shopping cart, bags and products are weighed and then sent to the central processor (step 106). The central processor has in memory the actual weight of the shopping cart and bags before they were delivered to the purchaser at check-in. The central processor then compares the actual combined total weight with a predicted total weight determined by the central processor from information received by the remote scanning device as shown in step 108. If the actual combined total weight is not within a predetermined range of the predicted total weight a notification signal is generated, shown in step 110, such as a sound to alert store personnel to the discrepancy and possible security violation. If no weight discrepancy exists, the purchaser proceeds to the checkout terminal shown in step 112.

[0035] Turning once again to Figure 6, if both security measures are passed then according to the preferred embodiment, the shopping cart 18 is moved forward to the checkout terminal 94 for checking out the products 34 contained within the shopping cart 18 and bags 20. The payment checkout terminal 94 is operable by store personnel 114 only and coupled in data communication

with the central processor 24 and is operable to effect financial transactions including acceptance of payment for transactions initiated by the remote scanning device 12. The remote scanning device 12 is then is delivered back to store personnel 114 and the merchandise checkout method is complete. It should be appreciated that according to the preferred embodiment, the information received from the remote scanning unit to the central processor is used to update inventory and stock control.

Claims

1. A method for a merchandise checkout system (10) comprising:

   providing a purchaser (14) with a remote scanning device (12) for scanning in product identity information (26);
   wirelessly transmitting said product identity information to a computer system (24), said computer system having a price information corresponding to each of said product identity information, said computer system calculating said price information from each of said product identity information to accumulate a total; and
   providing said total to one of a plurality of terminals when said purchaser is finished.

2. The method of Claim 1, wherein said remote scanning device is provided to said purchaser at a check-in station (16) positioned near an entrance of said checkout system (10) for accepting discount coupons from said purchaser and wherein said method further comprises transferring information on said coupons to said computer system for adjusting said price information for use with said remote scanning device.

3. The method of Claim 1 or 2, wherein said product identity information is wirelessly transmitted from said remote scanning device to said computer system by said computer system having a radio frequency (RF) transceiver (32) and said remote scanning device also having said radio frequency (RF) transceiver (32) wherein when said purchaser reads said product identity information said product identity information is transmitted to and received by said computer system; and

   wherein said price information is calculated in association with said received product identity information by said computer system producing a new total price wherein said new total price is transmitted to and received by said remote scanning device and displayed to said purchaser.

4. The method of Claim 1, 2 or 3, further comprising:

   deactivating a security tag device (28) associated with said product identity information by said remote scanning device when reading said product identity information on products chosen by said purchaser.

5. The method of any preceding claim, comprising:

   positioning at least one payment checkout terminal (94) near an exit of said checkout system; and
   coupling said payment checkout terminal in data communication with said computer system, said payment checkout terminal being operable to effect financial transactions including acceptance of payment for transactions initiated by said remote scanning device.

6. The method of any preceding claim, comprising:

   positioning a security station (92) near an exit of said checkout system; and
   generating a notification signal by a security tag detection device (96) if at least one item in a shopping cart has not been deactivated by said remote scanning device.

7. A system (10) for merchandise checkout comprising:

   means (12) for remotely scanning product identity information (26) from products chosen by a purchaser (14);
   means for wirelessly transmitting said product identity information to a computer system (24) having a memory indexing price information with said product identity information to accumulate a transaction total from a series of products presented for purchase; and
   means for providing said transaction total to one or a plurality of check-out terminals in response to a presence of said purchaser wherein a payment amount is presented.

8. The system of claim 7, comprising means (92) for determining an actual combined total weight of said products purchased during a purchase transaction, wherein said computer system includes an actual weight of said products in memory; and

   means (92) for comparing said actual combined total weight of said products with a predicted total weight determined by said computer system and means (92) for generating a notification signal when said actual combined total weight is not within a predetermined range of said predicted total weight for a transaction.

9. The system of Claim 7 or 8 comprising means for

receiving scanned and unwanted products by said purchaser and updating said remote scanning device with said computer system to reflect an adjusted price total to said purchaser.

10. The system of Claim 9, further comprising means for replacing said product identity information and said security tag device with a new product identity information and security tag device for said unwanted products.

11. The system of any of Claims 7 to 10 comprising:
means (86) for generating self-adhesive bar. coded labels (90), said bar coded labels indicative of a product code corresponding to produce (80) wherein said self-adhesive bar coded labels (90) are printed and dispensed after said produce is placed and weighed in produce bags (84) and said self-adhesive bar coded labels are attached to said produce bags and scanned.

12. The system for merchandise checkout according to Claim 11 further comprising means (92) for verifying that said produce bags are properly weighed, labeled and read by said remote scanning device by said purchaser.

13. An apparatus for use in a merchandise checkout system (10) comprising:

a remote scanning device (12) operable to read product identity information on products (26);
said remote scanning device for wirelessly transmitting said product identity information to a computer system (24); and
said remote scanning device deactivating security measures associated with said products.

14. The apparatus of Claim 12 or 13 wherein said remote scanning device reads said product identity information using infra-red technology to scan coded levels on said products.

15. The apparatus of Claim 12, 13 or 14, wherein said remote scanning device comprises a radio frequency (RF) transceiver for sending and updating said product identity information to said computer system.

16. The apparatus of any of claims 12 to 15, wherein said remote scanning device launches an electromagnetic pulse for deactivating said security measures associated with said products.

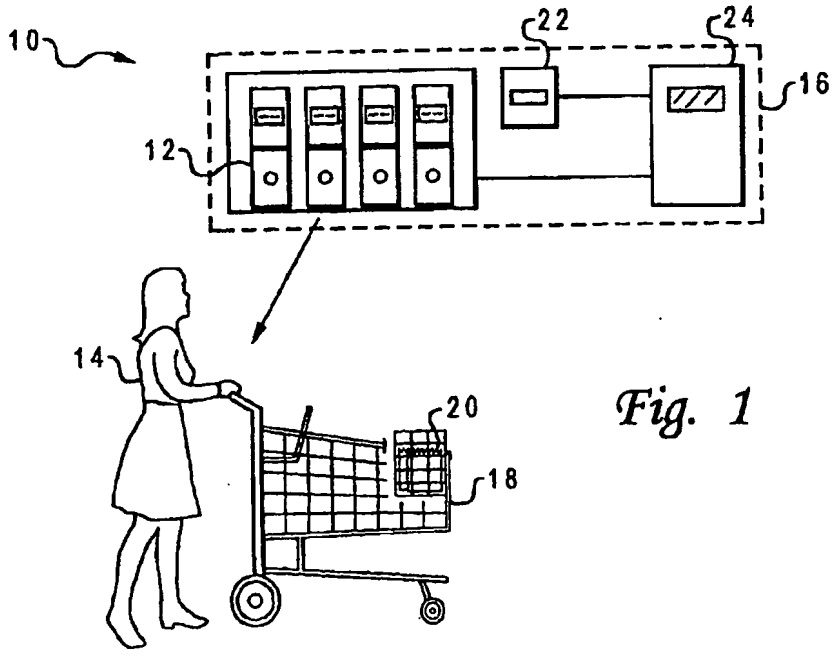

Fig. 1

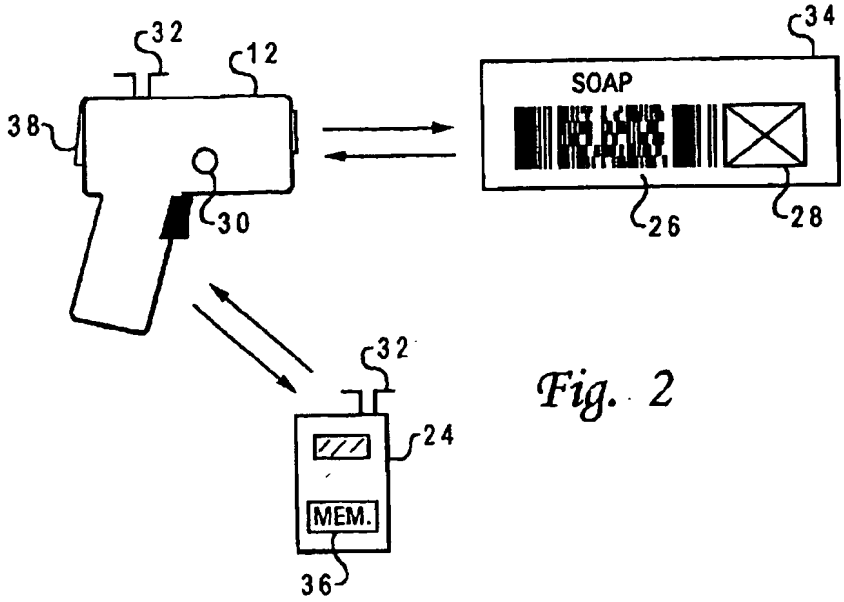

Fig. 2

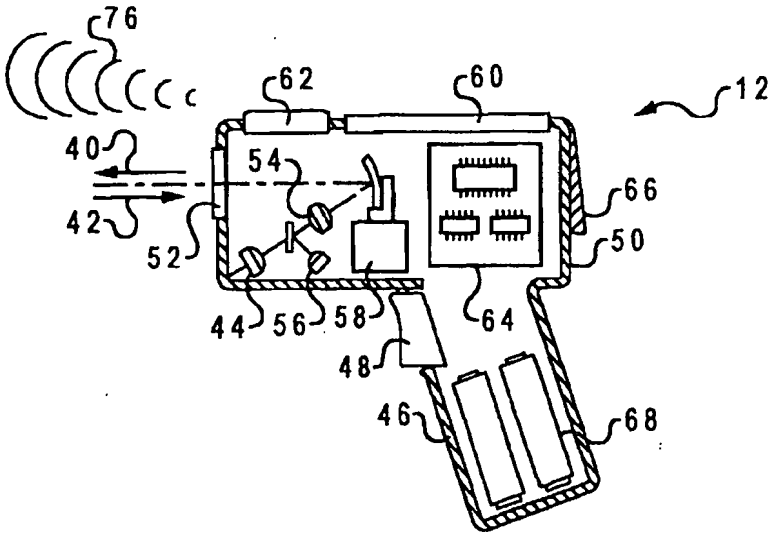

Fig. 3

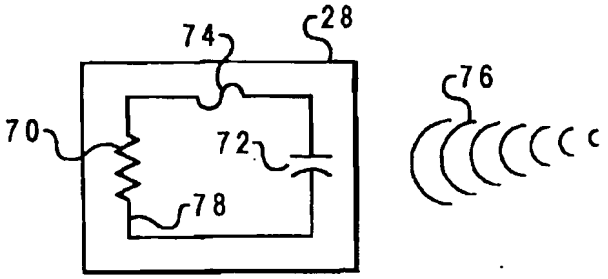

Fig. 4

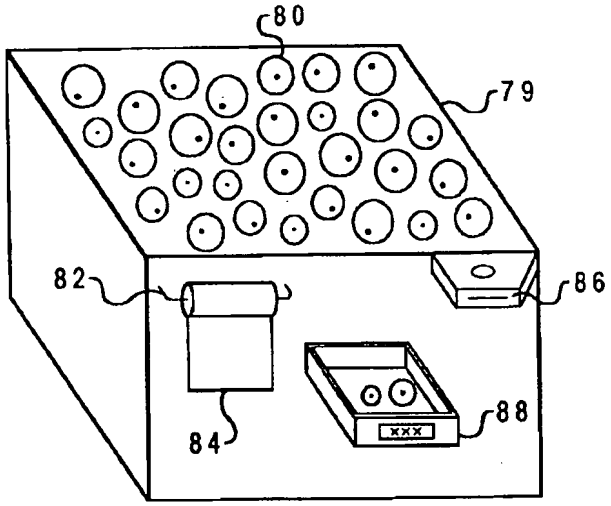

Fig. 5A

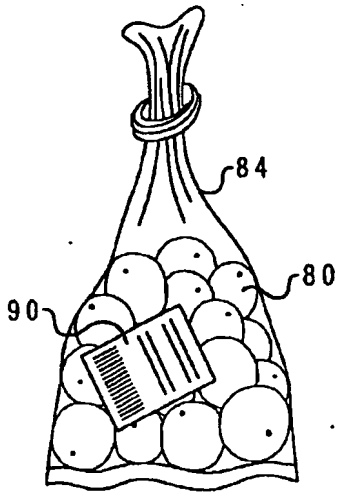

Fig. 5B

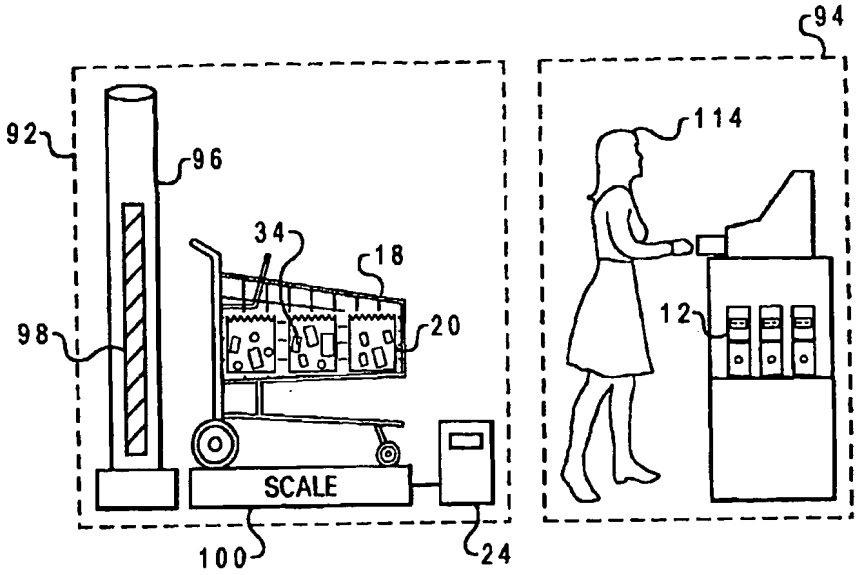
94
92
96
34
18
98
20
114
12
SCALE
100
24

Fig. 6

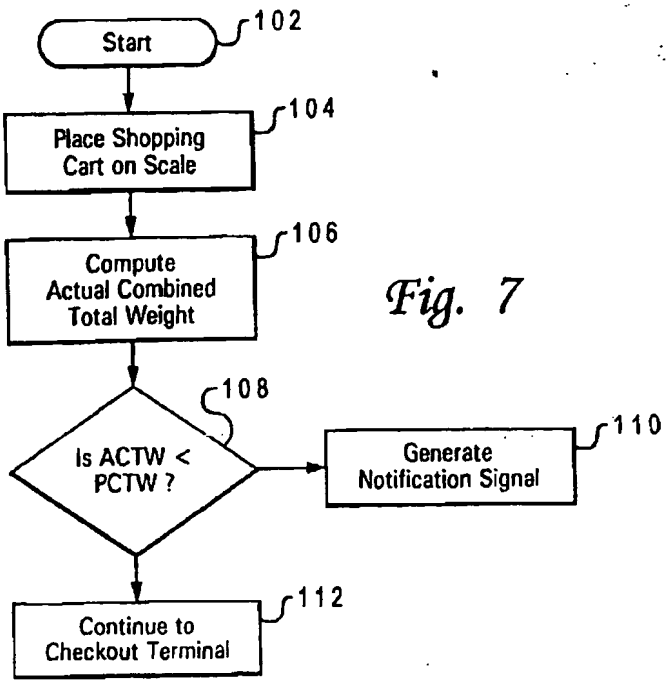
Start
102
Place Shopping Cart on Scale
104
Compute Actual Combined Total Weight
106
Is ACTW < PCTW ?
108
Generate Notification Signal
110
Continue to Checkout Terminal
112

Fig. 7